

Multi-shock shield performance at 16.5 MJ for catalogued debris

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While orbital debris of ten centimeters or more are tracked and catalogued, the difficulty of finding and accurately accounting for forces acting on the objects near the ten centimeter threshold results in both uncertainty of their presence and location. These challenges result in difficult decisions for operators balancing potential costly operational approaches with system loss risk. In this paper, numerical simulations and an experiment using the multi-shock shield system is described for a cylindrical projectile composed of Nylon, aluminum and void that is approximately 8 cm in diameter and 10 cm in length weighing 670 g impacting the multi-shock shield normal to the surface with approximately 16.5 MJ of kinetic energy. The multi-shock shield system has been optimized to facilitate the fragmentation, spread and deceleration of the projectile remnants using hydrodynamic simulations of the impact event. The characteristics and function of each of the layers of the multi-shock system will be discussed along with considerations for deployment and improvement.